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BIOTECHNOLOGY

HYBRID-DNA RESEARCH UNDER WAY AT KABI GEN

Stockholm KEMISK TIDSKRIFT in Swedish No 7 Jun 82 pp 25-26

/Article by Boel Jonsson: "Hybrid-DNA--Exciting Work for Organic Chemist"/

/Text/ Anette Elmblad has been working for 1 year with one of the newest specialties that a chemist can pursue--the hybrid DNA technique.

"It is an incredibly interesting area in a state of rapid development, on which a great deal of money is being spent. Of course, I was very hesitant in the beginning," Anette says.

Anette Elmblad is an organic chemist and works at Kabi Gen. It is probably, in proportion to its small size, one of the best known companies in Sweden. The personnel consists of three organic chemists (to be expanded to five) and eight microbiologists plus a managing director, a deputy managing director and two secretaries. They have no premises of their own but rent a few floors of laboratory space from the pharmaceutical company Kabi Vitrum, which owns 50 percent of Kabi Gen. There, they can also obtain administrative services.

Sequences of DNA are produced with the aid of a machine for automatic DNA synthesis; this is a prototype which was constructed at Kabi Gen. (See KEMISK TIDSKRIFT 4/82, p 45 "Automatic Fixed-Phase Synthesis".)

Mathematics, Chemistry, Biochemistry

Anette studied mathematics and chemistry at the university. First, two units of mathematics and the basic chemistry course (40 points) and after that two units each of biochemistry and organic chemistry.

"Those sections of chemistry seemed to me to be the most concrete."

"The next step in my development was to have children, when I finished college in 1977."

"Before winding up here I first worked for 1 year at Kabi Vitrum with purification of swine insulin , a job which to some extent is connected with what I am doing now, because insulin is one of the human proteins which can now be produced with hybrid DNA technique, although as yet to a limited extent."

"For 1 year I also worked in the Biochemistry Department of the Royal Institute of Technology on a basic research project involving phenol-degradable enzymes."

"The hybrid-DNA technique occupies mostly microbiologists and molecular biologists. The greater part of the work is done by them. The division of labor is done in such a way that the organic chemists synthesize small pieces, short gene sequences which the microbiologists use to identify the natural, human gene. It is extremely rare that more than one section of the nucleotide sequence is identified in a whole gene. The natural gene material in the form of m-RNA is taken from human cells from the organ one is interested in."

"My biochemistry is useful when I analyze the result of the synthesis. We check that the nucleotide sequence is the correct one, the one we are looking for, by means of a combination of enzyme degradation and two-dimensional chromatography."

"Our automatic synthesis machine has a high degree of accuracy. One nucleotide at a time is connected up and the result then lies at 90-95 percent. But this is a number which decreases rapidly the longer the sequence you do. This is why short pieces are done and later connected," Anette says.

"Fifteen nucleotides is the usual length, to be compared with for example an interferon gene, which consists of 514 base pairs. Even so, that is an unusually short gene."

Secret Research

At Kabi Gen's synthesis department where Anette works the activity is primarily aimed at the development of methods within the field, but certain projects commissioned by departments of higher education institutions are also undertaken, something which Kabi Gen is alone in doing, in Sweden. In the United States there are some companies which deliver oligomers (synthetic nucleotides) on order. Under the management of Kabi Vitrum in Strangnas the production of human growth hormone (with hybrid-DNA-equipped E-coli bacteria) has advanced far. It is expected that within 1 year larger amounts will be produced. The development of HGH (Human Growth Hormone) was done in cooperation with the U.S. company Genentech, with which Kabi Gen has a cooperation agreement.

Up to now, the hybrid-DNA technique has been nothing but a resource-consuming field. Large sums have been invested, particularly in the United States, which have not yet yielded any commercial results. This has the effect that the research and work within the area is surrounded by mystery-making to a greater extent, perhaps, than normal.

"People say that it is noticeable at the symposia. What is said there and what is the subject of the talks are things which have already been published. No one wants to talk about his newest discoveries, in case someone else should steal the idea before it has been patented."

"Sure, it would be fantastic if all the research groups could cooperate. Then the results would be enormous. But most of the research, both at the universities and in industry, is secret; for understandable reasons, in our competitive society."

Goal-Oriented Instead of Basic Research

"The fact is that I think the atmosphere here is more open than in a department at a higher education institution. The academic world so easily becomes a world in itself. Here, our outside contact network becomes greater. We cooperate with, among others, Karolinska Institute, where a research group is working on the solution of amino acid sequences for, among other things, the proteins we are working with."

"The next step in the development work we are doing here is to make a synthetic gene. That is to say, not only pieces of the DNA helix but an entire gene."

Something which also makes Anette feel more comfortable at Kabi Gen is that the research there is goal-oriented. The major portion of the research conducted at higher institutions is basic research.

"It is good that there are people who want to do this, but I prefer to see more rapid results."

Genes and Ethics

One discussion, which has followed the hybrid-DNA technique since one of the researchers in the field, American Paul Berg, himself brought up the issue (issues), deals with the ethical problems and the potentially negative consequences of the technique which are difficult to evaluate.

"In the beginning when hybrid-DNA technique was something new I was very sceptical. At that time there were also so many question marks. It was not clear to people for example whether the bacteria with altered DNA, with which people worked in the laboratory, could get loose and cause who knows what. This has now been studied and it is known that the bacteria cannot survive outside the laboratory environment."

"But discussions about the consequences of the technique must of course constantly continue. Not least important is that all types of people should participate in the discussion."

However, Anette does agree that there are certainly examples of specialists who become so involved in their own research that they see only their own viewpoints, and they become blind to any objections.

Traditional Professional Roles

Anette is fascinated by her area of work, and it is still, after 1 year, very new to her.

"Right now I cannot imagine anything I would rather work with."

"Here I also have the opportunity of travelling abroad to symposia, despite the fact that I do not have a PhD, something which is a prerequisite in many places."

"It is not necessary to work at a higher institution in order to get a PhD. One of my colleagues here is registered at an institution but is writing a dissertation on the work here."

"I myself have not felt any incentive to do that. In addition, I believe that if a girl is going to get a PhD she should do so before having children, otherwise the work could drag on forever."

But unfortunately we girls often say out of old habit: Oh, I couldn't possibly do that. Although if you want to be for example the leader of a research group it is necessary to have written a dissertation."

"It is a pity that there is still such a strict division between female and male professions."

"It is a pity, above all because it is in the traditional male professions that there are any job opportunities at all, even for girls," in Anette's opinion.

11949
CSO: 3102/419

ELECTRONICS GIANTS COORDINATE RESEARCH EFFORTS AGAINST JAPAN

Paris LE MATIN in French 6 Aug 82 p 5

[Article by Olivier Peretie]

[Text] Twelve of the largest groups in France, Great Britain, Germany, and Italy, are considering joining their research efforts against the Japanese.

Electronics is definitely becoming the major industrial bet in the closing years of the 20th Century. For the first time, the Europeans seem to have become aware of the magnitude of the challenge issued by their American and Japanese rivals. For the first time, they seem to respond by uniting their forces. Twelve large French, British, Italian, and German electronics groups are now engaged in a project to coordinate their research efforts as part of an European Community program called ESPRIT (European Strategic Program for Research in Information Technology).

They met without fanfare last week in Brussels, around a certain Christopher Layton, special counsel to the European Community on information technology and electronics. They all spoke English, but their accents revealed their origins more readily than their professional calling cards. Usually very discreet about their work and projects, they spoke of the future, and more exactly, of their joint future.

The participants in this semi-confidential meeting all belong to the research divisions and headquarters of twelve of the largest European electronics and informatics firms. These people control the future of hundreds of thousands employees at Thomson-CSF, CIT-Alcatel, and CII-Honeywell Bull in France, at General Electric Cy, ICL, and Plessey in Great Britain, at Siemens, AEG, and Nixdorf in FRG, and at Olivetti and Stet in Italy. And maybe even the future of the entire European industry.

These twelve groups are confronting the competition, not to say absolute domination in some sectors, of the Americans and the Japanese. On both sides of the Pacific, the competition in microelectronics (semiconductors, memories, microprocessors) is such that the Europeans are increasingly relegated to a purely marginal role and to technologic dependency. Yet this market, currently amounting to 9-10 billion francs, includes all the strategic products which lie at the heart of tomorrow's electronic development, and almost all of which the Europeans import or manufacture under license.

Last week's meeting is therefore of capital importance. The delegates of the twelve European groups in fact laid the foundations of a research and development cooperation program which they named ESPRIT. In a first stage, which could begin as early as 1984, this would involve the joint development of the sophisticated machines necessary to produce chips, those highly integrated circuits of the next generations. The EEC has already released 275 million francs for the development of some prototypes of this equipment.

Eventually, it would mean much further progress in the unification of the various research and development programs. This is the only solution for responding to the Japanese projects of Hitachi, Nippon Electric, or Matsushita. Supported by MITI, the Ministry of Industry and Foreign Trade in Tokyo, these three giants already have a strong lead, to the point where some ten American electronics and informatics companies, worried by the Japanese domination recently experienced on sensitive markets such as computer memories, have already decided to coordinate their research efforts in order to succeed as rapidly and inexpensively as possible to produce the raw material of the electronics energy, semiconductors. This is a market of 200 billion dollars by the end of this decade.

11,023
CSO: 3102/412

ELECTRONICS

FIRST DETAILS PUBLISHED ON ELECTRONICS PLAN

Paris ZERO UN INFORMATIQUE HEBDO in French 9 Aug 82 p 9

[Article by Jean-Louis Cousin]

[Text] Will the CII-HB product policy be redefined? Will there be a very large French computer? How about 32-bit minis? What will be the exact functions of Thomson, CII-HB, CGE, and Matra in components, mini-informatics, telecommunications, or office automation? How about military investments? Those who were awaiting details, are avid for information following the announcement by the Council of Ministers of 28 July, of the program for the electronics industry (01 HEBDO No 708). Before the short government vacation, the Ministry of Research and Industry published a memorandum providing some guidelines of its intentions.

To begin with, money, without which it would be unrealistic to set the goals that will henceforth be ours. As we indicated last week, the sum of 140 billion francs must represent the total investment derived from the state, from public and private enterprises, as well as from subsidiaries of foreign companies during the 1982-1986 period.

If we are to believe some of the rumors, telecommunications and professional electronics would receive a very large portion of this total. Indeed, merely maintaining the investment effort of PTT (Mail, Telephone, and Telecommunications) and the armed forces, would amount to 80 billion francs.

That leaves 60 billion to be distributed among the other nine sectors. In what follows, we provide some estimates for each of them.

What will be the government's contribution to these funds? If investments had maintained their current growth rates, the total amount for the next five years would have been 90 billion francs, of which the state would have supplied 25 billion francs.

Additional Effort

But the additional effort must now bring this contribution to slightly over twice as much (on the order of 55 billion). This means that the government would have to find 5 billion francs per year (in 1982 francs). At at time when austerity is more appropriately the order of the day, this is likely to raise some eyebrows among those who are holding the purse strings.

In terms of industrial policy, the ministry's memo makes the following points:

"French industry will have to concentrate its forces whether dealing with nationalized companies (Thomson, CII-HB, CGE, Matra), private enterprises, and PMI (small and medium-sized enterprises).

The government will use the weight of the nationalized sector (49 percent of the industry) to develop strategic sectors.... In each sector, the strategies of the national groups will have to be concerted so as to include the need for concentrating these investments to the greatest possible extent on one or two groups."

Concerning domestic competition within France, the memo stated:

"For sectors in which competition among industrial groups could occur, the allocation of state aid will be based on criteria of competence and correlation with overall strategy. An agreement will nevertheless be sought, in concert with the enterprises."

The PMI sector is not overlooked:

"At the other end of the spectrum, the PMI sector as a whole must constitute an essential resource in innovation, both in research and in technology. This vocation must be encouraged, both structurally and financially, by the government. The role of subcontractor to the large enterprises will have to be as profitable as possible for PMI's."

The following indications are provided for operation within the framework of the plan thus outlined:

"The national enterprises will present to the government their proposals for action (enterprise plans), which will describe strategies to be used for the selected goals, expected structural changes, annual budgets, and associated financing needs."

Plan Contracts

"These plans, established under the responsibility of enterprise managements, will result from extensive internal agreements, both technical and social, with social partners.

A plan contract between the state and each enterprise, formulated on the basis of the enterprise plan, will define the means contributed by each of the parties to reach the established goals.

For the private enterprise sector, agreements will be proposed which will make it possible to associate these enterprises in the national effort, and will make the allocation of state financial support dependent on obligations for research, investment, and financial contributions on the part of stockholders."

These are the essential points of the government's projects for each of the 11 sectors under consideration, with estimated figures (based on current rumors) for the allocated credits.

Components

In integrated circuits, the memo announces a "regrouping of industrial centers" to be accompanied by a reinforced effort of research and development. This declaration of intent tends to support, among other things, the hypothesis of a forthcoming combination of Eurotechnique (51 percent SPGM, 49 percent National Semiconductor) and Thomson Efcis (henceforth integrating Thomson's other subsidiary, DSC), to form a strengthened MOS center.

In discreet circuits, the effort would be concentrated on growth areas (hyperfrequency, power circuits), and on GaAs (gallium arsenide) technology. In passive circuits, the objective would be to attempt to limit our market coverage loss through the exploitation of several specific slots and licensing agreements.

The estimated credits are of the order of 10 billion francs.

Consumer Electronics

A major effort will be undertaken in color television. French production objectives will be sought for the new generation of products (videotape and electronic toys in particular). An R&D effort will be pursued for the "new products" which will appear after 1986 (cameras, video, latest generation videotapes, digital audio records, information terminals, and so on). International cooperation agreements will be sought for this purpose.

The estimated credits are 7 billion francs.

Intermediate Systems: Consolidated Line

The memo announces a "structural improvement" and "a continued effort of internal organization" aimed at a return of competitivity. It goes on to provide the following details: "The line of intermediate systems (management), which corresponds to a large slot of the European market, and to a steady investment on the part of CII-HB for several years, will be consolidated. A particular effort will be made to offer possibilities for connecting dissimilar equipment using the architecture of CII-HB's DSA networks."

In mini-informatics and distributed informatics, efforts will be made to avoid duplication of R&D expenses, as well as the dispersion of industrial and commercial investments. The sector will benefit from efforts approved within the national plan as "building blocks for minicomputers."

"In micro-informatics, a large effort will be devoted to mass production while encouraging individual innovation."

The estimated credits are 13 billion francs.

Office Automation

The guideline in this area is: "Consolidation of existing strong points: private telephones and electronic mail, combined with the will to invest in mini-informatics, should allow France to establish its position in this rapidly

growing market, and give it time to recover its weaknesses, particularly in reprographics, electronic typewriters, and printers, by taking advantage of notable technologies. The development of new products (text processing, electronic filing, networks, and so on) will facilitate this penetration.

The estimated credits are somewhat over 1.5 billion francs.

Software and Services

France's position is deemed to be good. It is however planned to improve it by stressing the industrial nature of production, by investments in software, and by a significant development of data banks.

The estimated credits are 4.5 billion francs.

Industrial Informatics and Automation

Innovation demand and the activities of informatics engineering companies will be encouraged as part of a "productics" program (see last week's 01 HEBDO No 708, pages 4 and 5).

The estimated credits are somewhat over 3 billion francs.

Space Industry

European collaboration must be reinforced in order to integrate national programs. An effort to penetrate countries without space activities will be undertaken in parallel, both on technical and political grounds.

All this activity will be carried out as part of the already determined development of Ariane 4 and the launching of Spot 2.

The estimated credits are 15 billion francs.

Professional Electronics

Our strong exporting position in the military domain (7.5 percent of the world market) is expected to be consolidated. In addition, the civilian markets (audiovisual, airport infrastructures, and so on) seem to be developed, primarily thanks to the government, and should make it possible to significantly increase our share of the world market.

The estimated credits are 25 billion francs.

Telecommunications

PTT is pursuing a policy of active support of the French industry, directly and through public laboratories. As stated in the memo, this is "in order to rapidly implement the current programs of enterprises through products, services, and new systems."

The estimated credits are 55 billion francs.

Scientific Instrumentation and Measurements

In addition to industrial consolidation, a slot policy is being planned, based on the good technical environment that is available, and on a research and development effort.

The estimated credits are 2 billion francs.

Medical Electronics

The already real commercial presence of French enterprises must be consolidated by the industrial development of new products, digital radiology, ultrasonics, and so on).

The estimated credits are 3 billion francs.

"New details will be supplied in September," we were told by Herve Lorenzi, responsible for informatics and electronics in the new cabinet of Jean-Pierre Chevenement. While waiting for them, those who are best informed might be able to use the above for sketching the industrial landscape of tomorrow's French electronics.

11,023
CSO: 3102/427

BRIEFS

POWER CHIP--While many microelectronics research laboratories are working on silicon circuits, the Laboratories for Applied Electronics and Physics (LEP) of Limeil Brevannes, in the Paris region, are exploring and exploiting the properties of another semiconductor, gallium arsenide (GaAs). LEP researchers have thus produced microwave power transistors with remarkable performances (Communique LEP CP 82-67). Unlike silicon bipolar power transistors, which are difficult to use beyond 6 GHz, GaAs field effect transistors can operate at much higher frequencies. Composed of 12 basic cells, the LEP power transistors deliver over 3 W at up to 12 GHz. These transistors are therefore particularly interesting for high-density, small-size telecommunications systems, and notably for equipment loaded aboard satellites. Within a few years, a large number of traveling wave tubes will be replaced by transistors of this type, which are expected to have a much longer life than vacuum tubes. Let us hope that these encouraging results, comparable to those obtained in Japan and United States will soon lead to industrial production in France. [Text] [Paris LA RECHERCHE in French Jul-Aug 82 p 893] 11,023

CSO: 3102/427

MODERN SYSTEMS FOR COMPUTER-AIDED DESIGN AT BMW

Leinfelden-Echterdingen DIE COMPUTER ZEITUNG in German 16 Jun 82 p 23

[Text] To an increasing degree CAD [computer-aided design] systems are being introduced into design offices and display screens are replacing design at the drawing board. Today a CAD system can increase a designer's productivity. Graphic display terminals have an important function in the CAD system. They convert values which are determined by the computer into dots, lines and combined curves and indicate to the designer the correct way to solve his problem.

Designers at BMW in Munich have also seen what advantages modern CAD systems offer. For years they have been making use of this advanced design technology. Thus, for example, finite element calculations by mesh generations for finite element networks, but mainly body designs are done by computers produced by Amdahl, Control Data and Prime Computer. In the interplay between computer and peripheral equipment Tektronix model 4014 and 618 display terminals have taken on an important function. They support the designer in the body construction sector.

Thus, prior to output on plotters the designer can observe the graphic representations in the previewing process via a Tektronix display terminal and can then decide whether the drawing is satisfactory and whether he wants to take plotter time. Dr Schuster, department head for CAD and CAM systems at BMW, reports that "formerly, when there were still no graphic display screens, graphic outputs were mainly produced via plotters. That was complicated because every time a drawing was incorrect, the plotting had to be done over."

Today BMW has about 30 Tektronix display terminals in use. The first graphic display screens were installed in 1977. In recapitulating, Dr Schuster says: "At that time we made the decision for this equipment because it can be used for graphics at an affordable price." The display terminals are hooked up with the Cyber 172, Prime 400 and 750 computers and, together with the IBM GA 3777, with the Amdahl V/7b. One of the first and principal applications even today is the use of the Tektronix equipment in the body design sector to represent the digitalized lines for handling the body shell. "With the help of graphic display screens the digitalizing process can be substantially accelerated by means of interactive interventions," says Dr Schuster.

In the intermediate steps the graphic display screens replace output from the drawing table by output from the display screen. Only drafts of a drawing are made on the drawing table. For reasons of quality a very precise plotter drawing must be produced as an end product, but in the initial stages the display screens are utilized to get this result. BMW is satisfied with the maintenance of the Tektronix display terminals. The response time according to Dr Schuster is normal and the technical service functions reliably. Also, the split of Rhode and Schwarz in the previous year created no problems in servicing the equipment.

As far as the future is concerned, the intention is to continue with modern graphic display screens. Of course, with graphics there is still the problem today of no standardization of the graphic interfaces. However, according to Dr Schuster, there are national and international efforts to establish this standardization. Recommendations for norms are under discussion and with its equipment Tektronix has had a certain influence on this development.

In conclusion Dr Schuster says: "In the future the equipment must have more intelligence. The good thing about this is that the 4110 series from Tektronix today is in keeping with this trend. Beyond that, additional capabilities will be necessary in order to speed up decentralized use of graphic work stations which in many large companies is necessary. A further line of development will result from the trend toward raster screens. In this case picture formation times and resolution must be improved in order to achieve acceptable work stations in the CAD sector."

12124
CSO: 3102/415

FRG STUDENTS OF PLASTICS PROCESSING LEARN CAD

Helsingborg PLASTFORUM SCANDINAVIA in Swedish No 6, 1982 p 49

/Article: "FRG Students of Plastics Trained to Use CAD Technique"/

/Text/ CAD is the established term for design work with the aid of computers. It is no wonder that tool designers have begun to utilize the possibilities and advantages of this method.

IKV--the Institute for Plastics Processing--in Aachen has been working in this field for several years. The first step was to complete the basic data--required for programming--and this is now practically finished.

The second step was to get these data to function in machine processing. In order to test this the institute set up a pilot station in the form of a complete CAD work area, which was modernized before the major colloquium this year.

The work area consists of:

1. A central Perkin Elmer 7320 computer
2. 2 terminals (graphic)
3. An alphanumerical terminal
4. A plotter

IKV Aachen has now advanced to the point where students are being taught the CAD technique for plastics purposes. At the same time as this is being done, commissions are being sought from industry. In this manner the industry receives help with its problems at the same time as the IKV is able to improve its programs and adjust them to industrial realities.

At present the CAD technique for molding tools for injection molding is the most important, but in the future molds for compression molding, transfer molding, foaming, thermoforming and blow molding will be covered.

CAD Technique for Extrusion

Extrusion nozzles are also very well suited to CAD computation. This applies primarily to geometrically intricate profiles such as window profiles. This

involves three-dimensional filling processes, which up to now could only be carried out after many years of in-house experience. To be sure, calculations were always made, but were always based on greatly simplified and thus unpermitted assumptions. Even the computational capacities contained in large mathematical computers up to now have not been sufficient for economical application in industry.

However, the IKV has continued its work on the basis of the finite element method (FEM) in the hopes that new types of computers will soon be able to carry out such calculations in an economical manner.

With the FEM technique the geometry of the flow channel is structured in very small volume segments--finite elements--. In the next operation the three-dimensional velocity field inside and outside the nozzle is calculated. Included in the considerations for this is the structural viscosity of the material and an assumed velocity profile in the flow channel.

The computer calculates the actual difference from a general velocity profile (inside the nozzle a parabolic profile; outside the nozzle a block profile) through iterative calculation. If the plastic has good flow characteristics (styrene plastic with low molecular weight) the calculated profile will agree with the actual one. However, in dealing with material with higher molecular weight, for example HDPE /high density polyethylene/, yet another calculation step follows in which the force field which occurs through the deformation of the melt is sought, or, respectively, the elastic deformation which is reversible is sought. These are responsible for the deformation of the plastic profile as soon as it leaves the nozzle.

The future goal is that through a dialog between the designer and the computer a point will be reached where the desired flow conditions in the nozzle and in this manner the desired geometry and measurements of the plastic profile will be achieved.

CAD Technique for Injection Molding

Injection molding of technically high-quality molded goods up to now required great efforts in construction, test operation, testing, trimming and adjusting before an acceptable result was finally arrived at. One of the reasons was that it was necessary to guess how the cavity was filled during injection, and where the filler should best be located.

This is facilitated by the so-called fill picture construction which was developed in Aachen and which shows where weaknesses in the flow path of the melt must be anticipated. The Aachen system is now also applicable to fiber-reinforced thermoplastics.

Another program makes it possible to test such details while they are still on the monitor screen of the CAD facility, that is to say before the molding tool and the piece have been manufactured. Here as well the FEM method enables calculation work with all kinds of loads, mechanical, dynamic, thermal and chemical. Much money can be saved on "trouble-shooting" long before the pieces have been manufactured.

In conclusion, CAD computers can help the designer with the choice of material from an economic/technical viewpoint, with the filling sequence, the location of knitting points vis-a-vis the placement of the filler, placement of reinforcement ribs, deformation in the molding plates, positioning, size and number of the heating channels, thermal effect for and position, size and number of the heating channels, thermal effect for hot channel molds, cooling time and cycle time calculations, etc.

11949
CSO: 3102/421

NEW BRITISH METHOD FOR MAKING PLASTICS MOLDS

Helsingborg PLASTFORUM SCANDINAVIA in Swedish No 6, 1982 p 66

/Article: "MISA--New British Method for Manufacturing Molds"/

/Text/ A new method for mold production called MISA for Molds in Superplastic Alloys has been developed at Birmingham University. With the MISA method, models of brass or steel can be perfectly reproduced without problems with casting shrinkage etc. Such molding tools can be produced in a short time, at costs which are comparable to aluminum casting. MISA is a stamping method in a superplastic alloy, as is shown here by Robin Penfold.

The characteristics of the alloys in the MISA process are that they are plastic at 270°C, but that they are harder than copper at room temperature. The material can be reused and is therefore suitable for short series molds. A hydraulic press (hand operated) and heated plates are used to produce the cavity. The stamping gives very good reproduction at 150 kp/cm^2.

MISA is said to be a simple, rapid and cheap method for the production of molds, intended both for prototypes and production. A highly glossy surface is achieved without the need for polishing, and the measurements are determined exclusively by the stamping model.

Material

The mold material in the MISA process is based on zinc, aluminum or other components, specially prepared into a fine-grained, superplastic state.

At low deformation speeds and within specified temperatures these materials show extreme plasticity and ductility.

At 265°C the rigidity of one of the MISA alloys, Z 21, is lower than cold lead, but at 20°C it is harder than copper. At temperatures below 0°C the hardness increases to nearly that of soft steel.

At 265°C it is therefore possible to press models of brass or steel into Z 21 without damaging the model material. Every detail of a polished, protruding or recessed surface is accurately reproduced.

Another MISA alloy, AS 5, based on aluminum-silicon, has a higher corrosion resistance and is therefore recommended for colored plastics. The alloy also has greater temperature resistance and is consequently used with advantage for polyamide injection molding. The alloy is superplastic at 350°C.

So far the MISA alloys are being produced in sheets with the measurements 30 x 30 x 2.5 cm, as well as in round billets 45 cm long and 7 cm in diameter.

Applications

The MISA process has been tested by Fordham Plastics, among others, which manufactured molding tools for high-precision acetal resin. A conventional molding tool had already been made from steel and the MISA mold was made mostly to evaluate the new technique.

After injection molding with both tools, the products could not be distinguished in any way. No wear could be determined after 1,600 shots into the MISA mold.

Another molding tool was manufactured for British Home Stores. In this case the purpose was to produce a hook intended to display hosiery in stores.

In the first batch the customer received 1,200 hooks, after which the mold was sent to the regular injection molder, who so far has produced 250,000 hooks in the same mold without problems.

The cost will of course vary with the complexity, but about 3,000 kronor is indicated as typical for a small mold. If the customer provides a model, the cost will be considerably affected.

Birmingham University has various units which are responsible for marketing the inventions made there. The MISA process is handled by Wolfson Industrial Unit, which has also patented the method.

11949
CSO: 3102/421

CURRENT RESEARCH IN CERAMICS TECHNOLOGY OUTLINED

Paris L'USINE NOUVELLE in French 24 Jun 82 pp 61-63

[Article by Pierre Laperrousaz]

[Excerpts] In a 10-year period, the United States has spent $100 million on the study of ceramics for applications with gas turbines. Between 1974 and 1983, the Germans will have invested 96 million marks in the same field. In 1981, the Japanese MITI [Ministry of International Trade and Industry] began a "ceramization" program for thermal engines, to cost $60 million spread over 10 years. And this is only part of the money being spent on ceramics research in those countries. In France, where things got off to a later start, there are several industrial and university groups at work, but it is hard to evaluate the total funding for their research.

There can be no doubt that the major industrialized countries believe in the future of ceramics technology. This technology does seem to offer the only solution in high-temperature structural applications, where super-alloys do not work. And the fact that research is focusing on thermal engines (gas turbines, diesel, gasoline engines) is easy to explain. The case for application is ideal: in order to increase the efficiency of these engines, light materials are sought (ceramics have a density of 3 to 5.6), materials which are resistent to heat and to thermal shock, and which have good mechanical properties. Moreover, the vast potential market justifies major efforts in research and the establishment of an industry that may later be able to supply other industrial sectors which are not economically viable in isolation.

These materials seem to have the greatest uses in mechanical and especially thermo-mechanical applications. Some of these are already in commercial use: ball bearings for hot parts of aircraft engines made of silicon nitride sintered under pressure, made in the United States; parts of fuel burners made of sintered reactive silicon nitride, made by Rosenthal in Germany; cutting tools made of sialon, mechanical rings providing a tight seal for the primary pumps in nuclear power plants, made of Refel silicon carbine, etc.

It is, however, thermal engine applications that seem most promising: rotor and stator, combustion chamber, and other parts of gas turbines for ground vehicles, and piston heads, precombustion chamber, collars, and turbocharger rotor for diesel engines. The United States is leading in the field of turbines with two major 100 hp turbine projects: the AGT [Advanced Gas Turbine] 100 of General Motors, and the AGT 101 of Ford and Garrett. The

Japanese are concentrating more on the gasoline and diesel engine. Some of the French companies--Peugeot, Renault, SEMT [Thermal Engine Research Company , a subsidiary of CGE-Alsthom--are also interested in the diesel engine applications. There are plans to "adiabitize" engines in order to recover the maximum calories from the exhaust gases in a turbocompressor, which may itself be made of ceramics.

It is probable that not one, but several ceramics will be used. "There will be room for everyone," says Gaston Sifre, the deputy director of research and scientific affairs at PSA [Peugeot SA], which is thinking of silicon carbide primarily for moving parts, and sialon and zirconium for parts of combustion chambers. At the SEMT, partially stabilized zirconium collars, manufactured by Lafarge Refractaires, are being tested on a diesel (200 hp per cylinder). They hope to achieve a gain of 8 to 10 percent in the calories provided by the fuel.

Other parts may also be considered: piston bosses, parts which undergo wear (tappet cams, for example). But these projects should not be expected to produce any results before at least 5 years, people at the SEMT say.

In any event, the production capacity is available. There are two major industrial production centers in this field: Lafarge Refractaires and Ceraver (CGE [General Electric Company] group. Lafarge has been concentrating primarily on partially stabilized zirconium, but it has also developed a sialon which seems to be giving good results when used in a cutting tool. Although less advanced in its work with silicon carbides and nitrides, it does have the equipment to sinter under pressure, with which prototype parts have been developed for the automobile industry. Ceraver, which benefits from the support of the CGE laboratory at Marcoussis, produces a sialon and silicon carbide by natural sintering using a procedure close to the Carborundum process (there should be no patent problems, says Ceraver). The company is also developing a silicon carbide heat exchanger, which makes use of the very high thermal conductivity of this material, which operates up to 1600-1700°C. A prototype has been sent to Coudamy, a furnace maker in Limoges, which plans to combine it with a burner to preheat combustion air by smoke.

In addition to industrial labs, research is going on in major research facilities such as the ONERA [National Office for Aero-space Studies and Research], the CEA [Atomic Energy Commission], and the CNRS [National Scientific Research Center], and in university research laboraties. The materials center of the Mining School in Corbeil is interested more particularly in composites. The laboratory of new ceramics in Limoges is studying natural sintering and sintering under pressure of nitrides, carbides, borides, etc., along with plasma deposits, and most recently, reinforced ceramics. Three laboratories--those of the Central School in Lyon, the Mining school in Saint-Etienne, and the INSA [National Institute of Applied Sciences] in Lyon --have just joined together to form the CRRACS [Rhone-Alpes Special Ceramics Research Center]. They will study the following materials: borides, carbides (of zirconium, silicon), nitrides (of silicon, boron), sialons, etc. the center is to have an isostatic pressing facility and the Saint-Etienne laboratory has a hot press with computerized control and data acquisition.

Characteristics of Different Ceramics

		1	2	3	4	5	6
		Alumine	Zircone stabilisée	Zircone partiellement stabilisée	Nitrure de silicium (frittage nitrurant)	Nitrure de silicium (frittage sous charge)	Carbure de silicium (avec bore et carbone)
7	Densité apparente	3,92 à 3,98	5,4 à 5,6	5,4 à 5,6	2,4 à 2,6	3,2	3,1
8	Coefficient de dilatation de l'ambiante à 1 000 °C	8,2 à 8,7×10^{-6}	8 à 10×10^{-6}	7 à 8×10^{-6}	2,8 à 3×10^{-6}	3,2×10^{-6}	3,5×10^{-6}
9	Dureté Vickers	⩾ 1 100	1 100 à 1 500	⩾ 1 100	1 500 à 1 700	⩾ 2 000	⩾ 2 500
10	Résistance à la flexion à l'ambiante (MPa)	250 à 400	250 à 350	500 à 750	150 à 300	700 à 1 000	400 à 500
11	Résistance à la compression à l'ambiante (MPa)	2 000 à 3 000	2 000 à 3 000	4 000 à 6 000	1 000 à 2 500	6 000 à 8 000	3 000 à 3 500
12	Module d'Young (GPa)	240 à 320	130 à 150	130 à 150	150 à 200	300 à 350	410 à 430
13	Conductibilité thermique à l'ambiante (W/mx°K)	4 à 6	1	1	10 à 20	30	90 à 100
14	Résistance au choc thermique	mauvaise	médiocre	bonne	bonne	bonne	bonne

One Handicap: Technical Ceramics are Fragile

To a great extent, the future of technical ceramics will depend on the solution provided by these research programs to a major problem that arises when considering the utilization of these materials in mechanics: their fragility. Unlike metals, ceramics are highly sensitive to local concentrations of stresses. And whereas a metal "holds" by spreading out the stress by plastic deformation, the ceramic material persistently breaks. This weakness is worsened by the phenomenon of "subcritical cracking." Under tensile stress, even lower than the breaking point, structural defects (which are almost impossible to avoid in ceramics) may slowly enlarge and cause a delayed break in the material.

In addition, these defects are dispersed randomly in ceramic parts, so that the results of stress measurements when ceramics are broken may be widely scattered. These two characteristics of ceramics still form the major obstacle to their industrial use, according to Jean-Marie Bind of ONERA. As a result, "research groups must become familiar with a new concept: that of the mechanical resistance of a fragile part on terms of probability of survival," he said. In terms of quality control of these parts, they must use a strength test, eliminating defective parts by subjecting them to a stress,field, comparable to but greater than operational stress, so that the survivors will have an acceptable probability of destruction when used.

In the case of rotors for the Ford vehicle turbine, which in actual operation undergo stresses of 200 MPa, the strength test should be done at 390 MPa in order to guarantee an operational life of 25 hours. The research facilities will also have to revise their "metals" mentality when designing parts in order to avoid local concentrations of stresses and to make the ceramics work with their weaknesses. One example: the high-temperature gas turbine with a revolutionary design which has been under study by ONERA. The blades, made of Ceraver silicon carbine, are hollow and are mounted on superalloy

spindles. The turbine's rotation flattens the blades on the periphery of the rotor and makes the ceramic work in compression (while in a conventional turbine the blades work in traction). Another concern which the designer must remember is the metal-ceramic joint. Breaks here are the cause of many failures. There are solutions (adhesives, a superalloy "gasket-seal" mechanical bond in superalloys, thermocompression, bonding by diffusion), but bonding still remains a limiting factor, to such an extent there is always an interest in reducing the need for bonding by changing the design of the parts.

One Response to Fragility: Composites

The answer to the problem of the fragility of ceramics will probably come from a new generation of materials: composites. Partially stabilized zirconium is already part of this in to the category of dispersed-particle composites. Then there are short-fiber composites (several millimeters in length). Two possibilities are already available on the market: silicon carbide fibers made by Nippon Carbon, and alumina fibers made by Dupont de Nemours. In France, the SEP [European Propulsion Company] and Lafarge Refractaires have joined together in a GIE [Economic Interest Group], the GEFIC [Ceramic Fibers Research Group], which is interested in the same type of products. The goal is to attain a production of several tons per year between now and the end of 1985. The production of short-fiber composites uses the same technologies as are used in conventional ceramics, particularly sintering under pressure. In this way, a silicon nitride reinforced with silicon carbide fibers has its mechanical holding power doubled.

But the commercially available carbide fibers do not consist solely of good points: their resistance to high temperatures is lower than that of solid carbide fibers. Long-fiber composites require more sophisticated manufacturing methods, which are totally different from the methods normally used in the ceramic industry. They start from a three-dimensional reinforced piece, to which the matrix is added by vapor-phase chemical deposition, liquid impregnation. France is apparently fairly well advanced in this field, with the work being done by companies such as the SEP and Aerolor. But, cautions Jean-Marie Bind: "There is still a great deal of work remaining to be done, both in terms of the use of these materials, and the study of the mechanics of their breakage."

7679
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MINISMELTER FOR CONTINUOUS CASTING OF NONFERROUS METALS

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German
15 Jul 82 p 7

[Article: "Continuous Casting Unit From NE Metals"]

[Text] Frankfurt, 14 July--One of the greatest technical advances in the steel industry since WW II is without doubt the continuous casting process. And as important as this energy and work saving process may be for the survival of many steel companies in the face of increasing international competition and the surplus of steel, it has had only a slight impact on production at NE [Neunkircher Eisenwerk] metals.

In continuous casting, the casting process is integrated with the steelmaking process. The molten steel issuing from the furnace or converter flows into a ladle and out of this as a continuous billet with cooling and increasing solidification on to the rolling mill where it is immediately processed into semifinished material. In conventional steel mills on the other hand, the steel is poured into molds producing ingots which are transported to the rolling mill on demand where they are brought up to a uniform rolling temperature in pit furnaces. It goes without saying that this process is extremely wasteful of energy.

At NE Metals completely different production conditions prevail. These metals are in all cases considerably more valuable than raw steel, and the production quantities are smaller. Brass currently costs DM 3,200 per ton and aluminum averages DM 3,700 per ton. Their production demands much more precise process control at a much lower production scale compared to steelmaking. This is especially true for silver and all other precious metals. Now one can, in perhaps a surprising manner, melt and continuously cast precious metals in a single process, specifically with the aid of a minismelting furnace with an integrated continuous casting unit. According to a report in the FINANCIAL TIMES of 5 July, the installation is manufactured by a small company in Scotland. It is no larger than a household washing machine.

The raw metal is loaded through a sealable hatch in the upper part of the unit; the continuous metal strip exists through a cooled graphite tool on the side. John Ewen, business manager of I.E. Ewen in Edinburgh, got the idea from his father and developed it to market maturity. In view of the small production

quantities, the Ewen casting furnace is primarily tailored for producers of precious metals who strive for an overseeable, precisely controllable operation in which the product emerges from the smallest possible number of steps in order to minimize loss of material. Mints are also interested in the process since coins can be stamped and embossed directly from the metal strip after a rolling operation.

In the production of precious metals, losses have always been a problem. The metal seeps into the various parts and joints of the smelting installation; and when dealing with small quantities where every gram counts, a significant difference can be observed between what is put in and what comes out. Since in making the smelting furnace aluminous cement is used, traces of the precious metal can be absorbed by the crucible lining. When melting is done in open crucibles, certain amounts of precious metals are lost by evaporation. Finally, in conventional smelting installations at least four men are required to operate the installation resulting in high personnel costs in addition to material costs. John Ewen believes that his Ewencast System precludes many of these disadvantages.

The dimensions of the Ewencast 100 were selected such that the system is attractive to businesses which produce or process smaller quantities of precious metals. The crucible holds about 100 kg. The melting temperature of up to 1,500 degrees Celcius is achieved through graphite heating elements. In a quarter hour 80 kg of metal can be melted. The crucible consists of antiwetting graphite which impedes losses. Stirring of the melt is accomplished by the injection of nitrogen. One man suffices for operating the furnace. At night and on week ends, a prewarming unit maintains a certain temparature level. Operating costs, according to Ewen, amount to one pound per hour. Interested parties can get further information from I.E. Ewen, 12 Davidson's Mains, Edinburgh.

9160
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COMPUTER-CONTROLLED FACILITY DEVELOPED FOR OPEN-DIE FORGING

Frankfurt-Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German
20 Jul 82 p 5

[Article: "Open-Die Forging With New Process-Computer-Controlled Facility"]

[Text] Aachen, 19 July--Open-die forging is a particularly flexible manufacturing process by which, with few and simple tools, products with a great variety of shapes and different sizes can be manufactured rather accurately. With the aid of open-die forging and the correct selection of forming speed and degree and forging temperature, clear improvements in material properties can be achieved.

To the forging operation falls the task of economically manufacturing variously shaped parts with special properties from a frequently imperfect rae billet. This is achieveable in the long term only if all conceiveable decision aids are available to the factory in transparent, useable form for planning and executing its forging task.

The present practice is generally characterized by empirical procedures. A further improvement in or shortening of the forging process (possibly with savings in the cost intensive intermediate heating), thus a quantitative and qualitative improvement, can only be achieved if the parameters and their interaction on the forming process can be even more precisely researched and taken into account in the future. After determination of optimal forging plans in the laboratory and transmission of these to the shop floor, the factory will be in a position to maintain specified process conditions.

Expansion of the Forging Domain

Forging aggregates for holding specific boundary conditions in the manufacturing process are in service as process-computer-controlled or process-computer-controlled-integrated forging facilities. Such installations have already been put into operation in several countries. With these installations, the forging of products with smaller dimensions or with more complex shapes can be more readily realized in the future. A series of shapes, for whose manufacturing closed dies are still required today, can under some conditions be manufactured in these facilities with relatively simple open-die forging tools. From this cursory presentation, several requirements for future research can be derived.

In this regard it makes sense to take note of the main connections which exist between the forming method (here forging methods) and the other disciplines required for producing forged parts, for example metallurgy, materials science and heat treating. Also, the aspects of energy and raw material supplies as well as workplace and environmental stressing, which are becoming of ever greater importance, can no longer be overlooked.

On this context, the research focus on open-die forging had already begun 5 years ago in the Institute for Plastic Forming at the Rhein-Westphal Technical University (RWTH) in Aachen. Within the scope of this program, practice related investigations are increasingly carried out whose results are regularly made available to manufacturers and forging-facility operators. The research programs have the following objectives:

--automation of open-die forging, including billet heating and cooling,

--computer-supported, optimized open-die forging (use of computers in optimizing open-die forging on a CRT and development of the control data) and

--enhancements of forging practice with respect to quality (tolerances and mechanical properties) and forming (production of almost-final-contoured forged parts and final products).

Thanks to the financial support of the German Research Society in Bonn-Bad Godesberg, the Technical Institute of RWTH, Aachen, was able to have a 6.3-mm forging installation designed, built and installed which can fulfill the extreme requirements of the listed research objectives. A basis for the unusual size of the press for an experimental laboratory resulted from the thought that in laboratory experiements, the more comparable the experimental equipment in size and function, the better the results it provides for practice.

In close cooperation with the Technical University's Institute, the firm SMS Scholoemann-Siemag AG, Duesseldorf and Hilchenbach, developed an experimental facility for massive forming which in general corresponds in size, construction and equipment to the open-die installati ns in production shops. The design of the press and the hydraulic, mechanical and electrical equipment for the press meets current requirements for universal application, simplified operation and maintenance, smooth and accurate functioning and economical operation. In the design high value was placed on the potential for tailoring the process speed to that required for optimal material behavior in each specific case.

The facility's furnace is a single-chamber furnace with natural-gas heating and achieves a maximum temperature of 1,300 degrees C. For loading and unloading billets, the furnace is placed transverse to and on the main axis of the press so that the manipulator can be used for the loading and unloading operation. For this the furnace itself is equipped with an appropriate transportation system.

The track-carried manipulator is used for holding the part during forging and for transporting parts to and from the press. The manipulator's feed motion during forging is accomplished via an oil-hydraulic cylinder. It possesses an electrohydraulic drive for travelling and for turning, lifting, pitching and side movement of the gripper. Operation is accomplished from the control

console of the foring press with manual remote control or automatic control in integrated operation with the press. The press is an above-floor design. The press frame is prestressed and consists of the following members: a support beam, two tension columns, two compression columns and a suspension beam. From the oversized diameter and generous material cross section of the compression columns results an extremely stable press (small elastic deformation) with respect to both axial and eccentric forces.

The more expensive construction of the prestressed press frame compared to a nonprestressed frame for the same machine weight pays off through better conditions for accurate work. The only alternative to this design would be the much heavier closed-casting frame similar to that of a rolling mill. The unit is designed for three types of operation: manual, automatic and programed. For automatic and programed operation the press, manipulator and furnace work as as integrated system. The associated electrical control units include, in general, the memory-programable control unit (SPS, PLC) and a digital process-control computer with a data display unit, printer and disk storage unit.

Simulated Optimization

In the design of the press and drive system, provisions were included for later addition for a closed-die forge and an extrusion press. For this, the frame had to be reinforced, an access for the extruders created and the drive and control units expanded. All prerequisites for the fulfillment of later research tasks in the areas listed were included in the plans so that expansions or modifications are possible without great expense in time and material. In addition the facility is already equipped with far more than the normal amount of measuring and recording equipment for the measurement and control of forces, displacements and speeds during forging or other forming processes.

Even though the experimental facility was constructed for versatile operation, the construction development of this facility has shown that the press itself is suitable as a prototype for a new generation of more economical open-die forging presses for use in the rough production environment of the foring shop.

With the test facility various forging processes will be investigated, especially with respect to further improvement of geometric and mechanical characteristics of the product. At the end of the current research program, it will be possible, among other things, to optimize a selected process on the CRT system, that is without the use of materials or tests. The press will be fully controlled with the values calculated in this manner. This is an objective which will have to take on greater and greater importance in forming technology if forming methods are to be optimized and materials better used.

The other goal is the purposeful tailoring of material properties such as strength and toughness. In this is to be seen one of the great tasks for future research and development in forming technology.

Through the fact that such an advanced forging installation is available, thanks to the financial aid of the German Research Society, at a neutral research institute--a technical university institute--which is not attached to any company, there exists for the industry involved the potential to accomplish the following in cooperative work with this institute:

--to optimize forging plans or to develop new plans for more complicated parts or qualities,

--to train personnel in the use of programed forging and

--to investigate problems without interrupting production.

9160
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BRIEFS

BELGIUM'S FIRST INDUSTRIAL ROBOTS--According to reports from the Belgian trade press a company with 14 employees has produced Belgium's first computer operated industrial robot. The reports show that the Distribel Co (Verviers) has received orders from 25 industrial firms amounting to a total of 250 million Belgian francs. Several "Phoenix" prototypes are to be introduced at trade fairs in Leningrad in October and in Chicago in April 1983. [Text] [Leinfelden-Echterdingen DIE COMPUTER ZEITUNG in German 16 June 82 p 2] 12124

CSO: 3102/415

NATIONAL ASSEMBLY ADOPTS RESEARCH BILL

Paris AFP SCIENCES in French 24 Jun 82 pp 1-4

[Article: "Scientific Research Policy and Organization"]

[Excerpts] Orientation and Programmation Bill Adopted by National Assembly

The research orientation and programmation bill and the report appended to it were adopted on 23 June by the National Assembly, with 333 votes in favor and 147 opposed. Amendments presented by the special commission of the Assembly and the government or the majority contributed to restore a version of the text very close to the initial bill. The Senate majority (RPR-UDF [Rally for the Republic-French Democratic Union]) had indeed considerably altered--"emasculated" according to Mr Jean-Pierre Chevenement--the bill which had been submitted to it last month by the minister of research.

Highlights of the Research Orientation and Programmation Law

Let us recall that the bill which has just been adopted by the National Assembly defines orientations for research and technological development and determines their financial and technical programmation for the period 1983-1985.

The objective is to increase the share of the gross domestic product devoted to research and technological development expenditures from the present 1.8 percent to 2.5 percent by 1985. To do so, the bill provides that the credits made available by the government's civilian research budget will increase at an average rate of 17.8 percent per year, and the personnel employed in public research by 4.5 percent per year.

To achieve this goal, the government will rely on four lines of action:

- "Mobilization programs," a list of which will be drawn up yearly; their aim will be to associate the various research partners (public research organizations, universities, public enterprises, private enterprises and research centers) to attain a consistent series of national interest objectives.

- Increased credits for basic research, which will increase at an average rate of 13 percent per year, special attention being given to the realization of large scientific facilities.

- Policy orientations decided after consultations with the parties concerned (scientists, organizations and ministries, research users) for applied or finalized research.

- Finally, the pursuit of technological development programs in four sectors: electronuclear, space, civilian aeronautics, and the oceans.

These measures will be accompanied by organizational and structural reforms:

- The personnel statutes of the various research organizations will be brought into line. A reference statute representing a derogation to the civil service statute will be established to provide the personnel with more mobility in their careers. Also, job training will be developed.

- A new type of institution, "public institutions of a scientific or technological nature," will be created so as to standardize the statutes of public administration research institutions such as CNRS [National Center for Scientific Research] or INRA [National Agronomic Research Institute].

- A new and very flexible form of association, the "public interest group," issued from the "semi-public corporation," will also enable a more powerful public sector to associate with private companies for specific projects.

- Finally, the regional dimension of the research policy is stressed. A "consultative committee" will be created in each region. Working with the Regional Council, it will give its advice on all questions dealing with research and technology. All regional interest programs extending over several years will have to be submitted to that committee.

Adoption of the Bill to Be Completed By the End of the Month

The orientation and programmation bill voted after a "first reading" by the National Assembly should be permanently adopted by the end of the month, we have learned from official source.

Since--to quote a statement of the minister of Research published on 24 June--the Assembly "did again what the Senate had undone" by reestablishing the text of the government's initial bill, the bill must again go back and forth. Not too many times however, since it is now examined "after a declaration of emergency."

This procedure provides that, after a "first reading" by both assemblies, a joint commission, in which the National Assembly--which is in session today, 24 June--and the Senate have equal representation, shall meet, and this could take place as early as 29 June. Should the two assemblies still disagree, which is likely according to observers, the text adopted by the deputies would become law.

Thus, next July, "France will be endowed with a strategy and legal means adapted to the fundamental effort which should bring it to the third rank of the world's scientific and technological powers," to quote Mr Jean-Pierre Chevenement.

"The impetus provided by the national symposium on research and technology (which took place last January) can from now on be reflected in the lives of laboratories, enterprises and regions, thanks to the provisions of the new law," the minister added.

"Mobilization programs will orient our research effort during the next 10 years," research jobs will be "redefined," "new technical and scientific data valorization and dissemination missions" will be entrusted to research organizations, the management of which will be "made more flexible," "generalized cooperation" will be implemented between research and industry, and the regions will have to play an "active role."

9294
CSO: 3102/423

SAAB OPTIMISTIC ABOUT SUCCESS OF SF 340

Historical, Economic Background

Stockholm NY TEKNIK in Swedish 24 Jun 82 p 12

[Article by Fredrik Dhejne: "It May Be a Modern DC 3 a"]

[Text] ■■ On 27 October this year the first Saab-Fairchild 340 will roll out of the Saab aircraft factory in Linköping.

■■ It has been 36 years since a civilian plane of this size has been manufactured in Sweeden. Saab called it Scandia. It was one of many types that were to replace the DC 3 a.

■■ But there were only 18 Scandias for Saab. The DC 3 a lived on. Perhaps with the SF 340 there will be a real replacement for the first time.

■■ Saab and Fairchild will assemble 72 planes a year in Linköping. Nine hundred new jobs will be created and Saab can reduce its dependence on the military.

■■ But the admission ticket to the civilian market is high: Saab and Fairchild are paying 800 million kronor--and that is just the beginning.

The new plane that is now being put together in the assembly plants in Linköping and New York will fly on feeder lines and in regional traffic all over the world.

In the United States--which is the most important market--this plane is often called a "commuter." That is the civilian plane's most expansive sector. There is talk of a demand for 2,000 planes from now to the turn of the century.

Saab and its American partner Fairchild hope to sell at least 600 of these. That corresponds to a value of 18 billion kronor.

The cooperation between Saab and Fairchild is the first big joint project between an American and a European aircraft industry.

Fairchild is really mostly a military manufacturer. But through its subsidiary Swearingen Aviation it also has a big civilian aircraft sector.

Swearingen specializes in smaller passenger planes. It is also this firm that will market the new plane in North America and Mexico.

When Saab began to think about a suitable civilian project it was gradually realized that Saab could not cope with that on its own.

Big Demand for Commuters

Market studies showed that there is a big demand for a new commuter plane. It was also clear that at least half of the market is in the United States.

For that reason Saab contacted several American plane manufacturers. Of those questioned: Cessna, Piper, Beech, and Swearingen, only Swearingen gave a positive response.

In June 1979 Saab and Fairchild started joint technical studies. Saab was thinking about a high-wing, simple plane for short runways.

Fairchild for its part was working on a low-wing plane without short take-off capability.

In September the technical studies were put together and the present design resulted:

A low-wing relatively sophisticated machine with no short take-off capability.

Parallel to the technical studies the firms formed a joint sales company, Saab-Fairchild HB. That company will sell the plane everywhere except in the United States, Mexico, and Canada.

Economic responsibility is equally divided between Saab and Fairchild.

On the other hand, Saab has a larger part of the development and testing.

The body of the plane and the pilot's cabin are made in Linköping. The wings, fin, stabilizer, and motors are manufactured in the United States. Final assembly and flight testing are done in Linköping.

For Saab the SF 340 project means the break-through on the civilian market. It is 30 years since the last one.

From 1946 to 1948 Saab designed a two-motor propeller plane for 36 passengers and built 18 planes of that design.

Compelled to Stop

The plane was called "Scandia" and was used by SAS [Scandinavian Airlines System] among others. It became popular, but the state forced Saab to stop production.

The cold war was on, and Saab got an order for 600 J29 Tunnans. There was no room for civilian production.

Economically the SF 340 is a very big project for Saab. The project will create 900 new jobs, and what with the production of parts for the DC9 and the BAe 146, the aircraft division's military percentage will drop from 80 percent to 50 percent.

The investments are in the billion-kronor class. The new factory will cost about 200 million kronor.

Development, design, flight simulators, two test bodies, and two prototypes will cost 600 million kronor in round numbers. Later, when serial production gets under way, the investments will run much higher still. Several billion in material alone.

The magical "break-even" figure will be reached when about 200 planes have been sold. The 111 already sold mean that they are just over halfway there.

New Construction Techniques

Stockholm NY TEKNIK in Swedish 24 Jun 82 pp 12-13

[Article by Sven-Olof Carlsson: "Lighter With Glued Plate"]

> [Text] In the new Saab-Fairchild plane SF 340 large parts of the body and wings are glued together instead of being riveted in the conventional way. The gluing fastens the plates together into stronger and lighter structures than can be gotten by riveting.

Riveting is still used for fastening the plate panels to the framework and for making plate panels of especially complicated geometric form.

All large or single-curve plates are glued together. There are such plates in the cylinder that forms the central fuselage and in the large, almost flat wing surfaces.

Two plates 0.6 mm thick are glued together. Later, thin ribs are glued on them to give them greater rigidity. In the final assembling these plate panels are riveted to a framework of girders and form a cantilevered section of the fuselage or the wing.

Gluing is also used in the thinner structures of the plane, including the horizontal tail wing, the stabilizer, and all doors. Here two plates are glued together with an intermediate stiffening of honeycomb material.

For fastening the thin aluminum plates together into the 1.2 mm shell of the SF 340 a new gluing technique is used, the Pabst method. It was developed in a project directed by the American air and space administration NASA. For air and space projects NASA did extensive studies of existing gluing techniques.

New Method Developed

Saab-Scania was among those consulted in the research. NASA decided that the prevailing British "Redux" method needed to be replaced.

The Pabst method was developed. It combines Boeing's technique for preparatory surface treatment, anode oxidizing with phosphoric acid, and McDonnell-Douglas's technique of applying a primer, glue, and hardening the glue in a tempering fur-furnace.

Considerably More Elaborate

Both Saab-Scania and Fairchild used the Redux method earlier. But they have now adopted Pabst as a technique for getting light, strong structures. The technique is automated to a great extent and has greatly reduced manual handling. It requires fewer glue experts and makes it easier to meet the work environment requirements.

The Redux method was considerably more elaborate, with its phenol-based glue in liquid and powder. The film gives an even thickness of glue. Saab is counting on it that Pabst will be the aircraft manufacturers' standard method in the future. It simplifies certification of future Saab-made civilian planes and contract jobs with other manufacturers.

The gluing process is as follows:

- The plates are accurately fitted together,
- The plate surfaces are oxidized with phosphoric acid (the plates that are not glued are oxidized with chromic acid),
- Epoxy primer for the glue is sprayed on, evaporated, and dried, and the plates are cooled,
- A coating of lime is put on the plates and stringers,
- Plates and stringers are properly assembled,
- The whole is rolled on a cart into an autoclave for tempering the glue,
- Fine touch-up, milling the edges,
- Inspection of panels and test pieces; the test pieces are subjected among other things to destructive testing.

Gluing in Several Steps

For large panels such as those in the sides of the fuselage the gluing is done in several steps.

In the SF 340 the circular form of the fuselage with only tensile stresses makes for simpler calculation and testing of the strength of the panels, aside from the advantages the design has otherwise.

New Materials

Stockholm NY TEKNIK in Swedish 24 Jun 82 p 13

[Article by Fredrik Dhejne: "Fuel Economy and Easy Maintenance"]

> [Text] The Saab-Fairchild 340 is a plane of conventional design. But to get low fuel consumption and cheap maintenance the plane is manufactured with advanced production methods and partly of new material.
>
> When it was being designed it was decided that large parts of the body and wings would be glued together for low weight and high strength.

The body is built in three sections: Nose with pilot's cabin, cylindrical pressure cabin, and tail section with fin and stabilizer (tail wings).

The central section is made up of four large panels that are riveted together. The panels in turn consist of alloyed aluminum plates that are glued togehter.

The body is reinforced with riveted frame and longitudinal glued reinforcements called stringers. Ventilation system, batteries, and hydraulic lines are placed outside the pressurized cabin. This simplifies maintenance. In addition, the body does not run the risk of being damaged by leaks from the hydraulic systems or the batteries.

In the wings the same technique is used as in the body. They are built up around two longitudinal beams. On the beams lie plate panels (double glued plates) that are riveted to the beams and transverse framework. Here, too, the panels are reinforced with glued stringers.

The wings are shaped to give extra-high lifting power and low resistance. This is achieved by making the wings thinner and narrower than a more conventional design.

Hot and High Airports

Aerodynamically the plane is designed to give the best possible performance at hot and high-altitude airports.

The two fuel tanks are in the wings. The engine nacelles, with the main landing gear, are also on the wings.

The tail fin and stabilizer (tail wings) are made of glued panels and aluminum honeycomb structures. The doors are also made in the same way.

Compositions of aramide fibers and epoxy are used in the cowling around the attachment of the wings to the body, in the rudder, and in valves. The nose and tail cones and the cabin floor are made of glass-fiber laminated plastic.

The motor is a General Electric CT7-5 turboprop. It was chosen primarily for its low fuel consumption. General Electric believes so much in its motor that

it promises to pay the airlines for all fuel that exceeds the guarantees.

The motor was developed from a helicopter motor. That is a great advantage, according to Saab. The core of the motor, the so-called gas generator, has been flying for a long time and demonstrated its quality.

The motor is designed in modules to simplify maintenance. This means among other things that parts can be replaced without the motor's needing to be taken out of the plane.

Plastic Propeller

The plane will not be equipped with any APU taxiing unit. Instead, to provide current and heat on the ground one motor will be run idling with the propeller braked.

The propeller is made by the English firm Dowty Rotol. Like the wings, it is designed thinner to give high lifting power and low air resistance. Especially in take-offs and while climbing.

The propeller blade is built up around a frame of carbon-fiber plastic. In the inside of the frame there is a layer of polyurethane foam. The surface of the blade consists of glass-fiber-reinforced epoxy plastic. The blade is mounted on a duralumin boss.

The pilot's cabin contains computerized flight instruments and picture screens with color reproduction (cathode ray tubes, or CRT).

The instruments and flight electronics are supplied by the American firm Collins.

The system is digital and includes a test function that continuously monitors the plane. In any trouble an alarm sounds and the pilots get help in finding the trouble and taking countermeasures.

The warning system is based on the principle "black is O.K." This means that when the plane is flying as usual and all systems are functioning as they should, no lamps light up. The warning panel is thus black.

The pilots who fly the SF 340 will normally fly up to five or six runs per work shift. Flight safety, therefore, demands a good working environment. The new flight electronics with data screens is a part of that.

But also the fact that the cabin is roomy and easy to get in and out of. The instruments and seats are so placed that the working position will not be tiring or uncomfortable.

The plane will most often fly at low altitudes in areas with heavy air traffic. For that reason the windows in the pilot's space are made extra large for the best possible visibility.

Could Replace DC 9, F 28

Stockholm NY TEKNIK in Swedish 24 Jun 82 p 14

[Article by Fredrik Dhejne]

> [Text] Saab-Fairchild's new plane SF 340 has Linjeflyg worried. The plane has both speed and range to be able to replace the DC 9 and the Fokker F 28 on short runs.
>
> Besides that, the SF 340 is so quiet that it can fly at Bromma. That makes for new struggles over the future of the airport.

"The 340 is no threat to us as long as it is used for what it is built for. But we are worried that it may be used in a different way."

That is what Jan-Åke Jonsson, planning chief of Linjeflyg, says. He says the SF 340 is a fine plane, but that it should not be used to replace traffic that is carried today by the Fokker F 28.

"If anybody gets to fly from Bromma--there has been talk about Bromma-Karlstad --then we shall have to close down corresponding lines from Arlanda."

Jan-Åke Jonsson emphasizes that if the F 28 is replaced at, e.g., Karlstad, that does not release any resources for LIN [Linjeflyg]:

"The flight schedule is so constituted that there will not be a whole plane left over. It will only mean that we have gaps in the schedule. Then the plane will be sitting on the ground longer, and that is not efficient utilization."

He also says that Linjeflyg has studied the possibilities of "salvaging" traffic at Bromma:

"We were counting on the Dash 7, among others, but our calculations showed that dividing the traffic between Bromma and Arlanda would result in annual losses of about 100 million kronor."

At LIN it is considered that it will be best if the SF 340 is introduced on the lines that are flown with Twin Otters today. LIN prefers that the present assignment of rôles among SAS [Scandinavian Airline Service], LIN, and Swedair remain unchanged.

One change that would certainly be accepted would be for LIN to be allowed to take over SAS's domestic traffic in Sweden. But nobody is saying that outright.

Must Have Bigger Planes

At Swedair, which has bought 10 SF 340's, it is felt that the worry about competition is exaggerated:

"This fear that the SF 340 will take traffic away from LIN is exaggerated. There is hardly a one of Linjeflyg's long flights that can be replaced with the 340.

"Their lines have too big a base for traffic with that type. We should have to fly in convoy with them, and that is not profitable," says Carsten Lundahl, marketing chief at Swedair. He says that what is happening now is a natural development upward:

"We are moving up to a higher level, just as in a few years Linjeflyg will presumably have to replace the F 28 with a larger plane."

Carsten Lundahl says that Swedish plane fares are so low that the costs make it necessary for a plane like the Twin Otter to be fully occupied every time for traffic to continue.

"The limit for our profitability is a plane with a capacity of 26 passengers. Then if we have 60-percent occupancy we can just cover our costs."

It is these calculations that are behind the purchase of the SF 340. Certainly the SF 340 carries 34 passengers, but with an average of ca. 22 seats occupied the costs will be covered. Then if the remaining seats are sold the profitability increases greatly.

For the future Carsten Lundahl believes that Swedair will continue as now to fly certain lines for LIN and SAS side by side with its other activities. (Taxiplane service and target-towing for Defense.)

He also believes that there is a potential for the SF 340 in traffic from towns in southern Sweden to Copenhagen.

"There are no talks with SAS under way about our flying on inter-Scandinavian lines, but it is conceivable. We also hope that we can get a line of our own," says Carsten Lundahl.

At the Swedish Civil Aviation Administration, too, it is believed that the SF 340 is well suited for regular flights at short distances.

"We view the development positively," says Anders Sviden, of the planning section of the administration.

"The shortage of good planes has been a retarding factor. There has been a vacuum in that no planes were developed for secondary traffic."

Anders Sviden points out that the SF 340 is in the same size class as the legendary DC 3, and that it is perhaps true that the latter has had no real successor until now.

Anders Sviden believes that the SF 340 has a broader field of use than simply as a feeder plane:

"It can replace certain international jet traffic. The shorter the distance the more profitable a plane like the SF 340 is."

In Scandinavia there are several suitable lines, and he says that in any case in Sweden the Civil Aviation Administration is more inclined than formerly to grant concessions to firms other than SAS.

Should Be Controlled by Demand

Jan Hull, head of the sales company Saab-Fairchild HB which is marketing the plane, says that the SF 340 has a bigger base than the sales show.

He also says that there is a partially artificial division of the domestic air traffic in Sweden.

"It should be that the demand for travel determined the service offered."

Jan Hull points out that Östergötland, for example, is very poorly provided with airline service:

"If I have to go to Copenhagen I do not want to fly via Stockholm, and from Norrköping there are too few flights.

"More frequent flights would generate more passengers, and SAS has to make a stop at Copenhagen to fill up its DC 9's." (Västerås—Norrköping—Copenhagen and return.)

Jan Hull says that a smaller plane like the SF 340 could meet this demand and make more flights for the same cost as a DC 9. He thinks the trend is in the right direction:

"With the new management in SAS there are good prospects for a realistic view of how Scandinavian air traffic policy should be formulated."

Liberal in Moderation

On the other hand, Jan Hull is dubious about a total liberalization of air traffic policy like that in the United States (deregulation).

"There is still need for a form of controlled liberalization. It is a little too easy to borrow money to start small airline companies. A certain guidance is necessary," says Jan Hull.

SAS also draws the same picture:

"We are open to cooperation with other airline companies. But we do not see that butterfly planes are in anybody's interest. It is a little too cheap to buy a smaller airline company," says Krister Westerdahl of the commuter flight division of SAS.

He is not afraid of competing SF 340 traffic. But he says it is important for regional air traffic and feeder lines to be adjusted to the whole airline system.

Krister Westerdahl, too, believes that certain jet traffic can be replaced with smaller planes.

"I believe that it might be better to use SF 340's on a lot of runs. But we do not yet know how it will work out.

Facts About the Saab-Fairchild 340

The SF 340 is a small passenger plane with 34 seats. The plane is designed for short distances and as a feeder plane between smaller and larger cities. The plane is also produced in an "executive version" with fewer seats and expensive fittings.

External dimensions:

Length	19.72 meters
Height of fin	6.87 meters
Wingspread	21.44 meters
Track width	6.71 meters

Internal dimensions:

Passenger cabin (length)	10.57 meters
Passenger cabin (width)	2.16 meters
Ceiling height	1.83 meters

Weights:

Empty weight	7,194 kg
Maximum take-off weight	11,794 kg
Maximum landing weight	11,567 kg
Fuel capacity	2,676 kg
Maximum payload	3,239 kg

Range, at economical speed with 34 passengers @ 85 kg + 315 kg of baggage: 1,110 km. Passengers 34, crew 3, maximum speed 508 km/h, most economical speed 400 km/h. Price ca. 30 million kronor ($4.75 million).

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LUFTHANSA EXECUTIVE DISCUSSES AIRCRAFT NEEDS FOR 80'S, 90'S

Gelsenkirchen AEROKURIER in German Jun 82 pp 669, 674-675

[From an address, "Opportunities and Restraints," given by Reinhardt Abraham, member of the board of Lufthansa, at the Seventh Day of European Aviation Pioneers in Toulouse at the beginning of May]

> [Text] The increasinly close involvement of global air traffic in world economic development offers opportunities and restraints. This applies equally to periods of growth and recessions--although in different degrees. Dipl.-Ing. Reinhardt Abraham, member of the executive board of Lufthansa, examines in the following article the connections that exist, the opportunities available and the overall conditions that could exercise some limiting effect. Even a pessimistic look shows that global air traffic will remain a growth industry for this century.
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> The article itself is the printed version of a presentation by Reinhardt Abraham on the occasion of the Seventh Day of European Aviation Pioneers, which was held at the beginning of May in Toulouse in honor of Carl August Freiherr von Gablenz.

Equipment For The 1980's and 1990's

If we now turn our attention from the problems of the infrastructure to the equipment for global aviation at the end of the 20th century, the furnishings of the new generation of aircraft, A310, Boeing 757 and Boeing 767, with their fully integrated electronic guidance and navigation systems and the ability to present information on screens, may appear to be almost ahead of their time.

I would like deliberately to exclude the question concerning the areas and directions in which we might expect technological progress in civilian aircraft construction, since I have already stated my opinions on several occasions elsewhere. In the opinion of some, dramatic progress in aircraft construction is no longer possible and can hardly be expected in the next 20 years. I cannot agree with this formulation; basically it stands up to only superficial scrutiny. What we are experiencing with the new generation of aircraft on the flight deck, the innovations that we have available in different aircraft systems and in the area of materials and constructions methods, are technological revolutions--at least apparent to the pilot and the engineer. Otherwise they would hardly cost so much.

/The air travel industry will, therefore, place orders for a substantial amount of new equipment, as soon as it is out of its recession. Although many airlines today do not know how they will find the money, it is already certain that in the next 10 years about $100 billion will have to be spent to replace out-of-date equipment and to be ready for a growth in traffic between 5 and 6 percent. A growth rate like this, clearly higher than the expected increase in the world gross national product, does not seem unrealistic in the light of increasing global economic affiliations, demographic developments and the constant need to acquaint oneself with foreign countries and people./ [in boldface]

To meet the airlines' needs, further aircraft development is needed, such as the much-discussed 150-seater for short-and medium-range traffic and an aircraft with 200 to 225 seats for long intercontinental routes. Naturally, the market potential for the first type is much higher in the long term. But the conditions for the success of a project like this are extremely difficult, given today's circumstances:

--To achieve good sales figures from the outset, a new 150-seater must be economically clearly superior to the well established Boeing 727--and not simply in fuel consumption, but on the bottom line. In particular because of the high capital costs of the new aircraft, this precondition has not yet been met, even if we continue to include above-average increases in fuel prices. So, market potential remains restricted initially to fleet expansion in this capacity class.

--An optimal engine must be available, which incorporates the newest technology and is adequately tested for a twin-engined aircraft. There are difficulties here as well.

--The airlines must be prepared and financially able to place prompt orders for this type of aircraft, in adequate numbers. The high development costs for the fuselage and the engines require an adequate rate of production without serious gaps in employment, with a comparatively low return per unit.

When will the airline industry have achieved the necessary prosperity again?

--As soon as the conditions mentioned have been fulfilled, extremely intense competition will flare up in this class of aircraft. Economic success will come to the manufacturer who offers a superior product consonant with the ability of the industry to invest. So it makes complete sense to wait for some time in order to utilize further technological advances to an even greater degree.

Proper "timing" will play a key role in this project.

/Summing up, it is my opinion that development of the European A320 Airbus should be pushed ahead, until this design is actually ready for the market. By "market readiness" I do not just mean winning a minimum of initial orders, but the prospect of sustained saleability on the basis of an economically attractive, internationally competitive product. It is of no importance for this evaluation whether Lufthansa will be among the "launching customers" in this instance, or not./ [in boldface]

As is known, a "small" long-range aircraft project, known as TA 11, is competing with the A320 to be first in time--and it is considerably behind, according to the current state of affairs. I am also not overlooking the difficulties here. The market potential, in numbers of aircraft, will probably reach scarcely 40 percent of the short-range 150-seat aircraft. The figure is higher in terms of return.

There is a special problem here in that the traditional large initial orders (particularly the U.S. trunk routes) are largely eliminated in this market. On the other hand, customers for a TA 11 would be found among the 100 medium-and small-sized airlines for whom a "Jumbo" is out of the question or who could not live just with the Boeing 747. This is a laborious but perhaps rewarding piece of business for the marketing department of an aircraft manufacturer.

The majority of these airlines do not pursue any long-term planning and they buy what is available at affordable prices on the market. So it requires a certain amount of courage to rely on this type of prospective customer--a problem that must not be underestimated. Only thorough market analysis can help here.

Looked at from the other side, the TA 11 project offers chances that have to be analyzed thoroughly:

--For the airlines there is the opportunity for a greater number of direct flights, higher frequency of flights with all the accruing advantages, an overall better profit-taking from the market, and in many cases the opening and/or maintaining of long-distance traffic.

--For the aircraft manufacturer Airbus Industrie and all the supplier companies, it means penetration of the complementary long-range market, sensible expansion of the family design concept with a further lowering of costs in all component groups and systems that do not require any new development.

--An opportunity for diversification of risks for manufacturer and customer. Lufthansa, for example, would have reservations about making its entire short-range fleet dependent on Airbus Industrie and its long-range fleet on Boeing.

--The dropping of the Lockheed 1011, the uncertain fate of further development of the DC-10. The necessity of replacing this model aircraft after 1988 at the latest, a move in which a smaller-capacity aircraft tends to offer advantages.

--Timely availability of modern engines, which have been tested and which can also be used in other types of aircraft.

--The exploitation of a promising market niche, to fill which the main competitor, Boeing, does not possess a similarly favorable financial or technical point of departure.

Decisions about new projects in aircraft and engine construction will doubtless become more and more difficult and will require increasingly more thorough preparation.

High development costs mean high financial risks. There must be no doubt in anyone's mind that without state guarantees and additional subsidy measures, healthy competition between manufacturers can no longer be assured. If this requirement is not taken into account, the danger of monopolization in the airline industry exists, with all the negative consequences for price development in aircraft construction, which is already once more threatening to negate the fuel- and cost-saving properties of new designs.

The airline companies will have to continue to plan their buying policy with a view to opposing any monopolization, even in partial markets.

Supersonic Travel?

In the past, looks ahead at air travel at the turn of the century nearly all contained an element of science fiction: supersonic, hypersonic, space travel . . . . Barely 10 years ago, a major experienced airline of U.S. origin was accepting bookings for its first scheduled flight to the moon and was exhibiting a model of its first "space ship" throughout the world. In the meantime, oil crises and deregulation have directed our thinking onto quite different paths, and there are even signs of a renaissance of the turboprop aircraft--at least for short hauls.

Still, I am convinced that we will not stop at Mach 0.8 in intercontinental air travel. Travel times between 8 and 24 hours continue to challenge the mind of the inventor. A second-generation supersonic aircraft must be financeable, supersonic flight must be affordable. Development will, therefore, be pushed ahead with extreme caution and strictly according to economic viewpoints, with the key role being assigned to the engines. Range, fuel consumption, environmental pollution and maintenance costs will determine progress and they represent a second sound barrier which still has to be broken.

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BRIEFS

FOKKER 'FXX' MARKET STUDY--Following the cancellation of the joint project for a 150-seat airliner with McDonnell Douglas, Fokker is now studying new possibilities for an independent airliner project. Under discussion is a 100-seat machine which could fill the gap between the current Fokker F-28 and the planned 150-seater. The studies at Fokker are still at a very early stage. For example, it is still undecided whether the new aircraft will be powered by turboprop or jet engines. Fokker is also still undecided about the economical cruising speed at which the new aircraft is eventually to fly. The objective of the project is not so much high cruising speed as a highly economical alternative to aircraft in the 100-seat category. With its market studies for the 100-seater, Fokker is continuing its earlier work for the F-29 project, a 132-seat airliner that did not meet with the expected response in the market. The new study for the 100-seater goes under the project designation FXX at Fokker. If market response to the Fokker FXX project is positive, final realization of the plan will probably still depend on whether the Dutch are able to find another strong manufacturer as a partner for this program. On the other hand, it is not completely out of the question that Fokker will participate in the program for the small Airbus, the A320, if the starting signal is given in the near future at Airbus Industrie for this 150-seat airliner. [Text] [Gelsenkirchen AEROKURIER in German Jun 82 p 660] 9581

AIRCRAFT ENGINE CONSORTIUM--There has been some movement in the hotly debated question concerning a new engine for a 150-seat airliner--such as the Airbus Industrie A320. At the end of May, Rolls-Royce, Pratt & Whitney, MTU and the Japanese Aero Engine Companies announced that they were beginning formal discussions concerning the joint development and production of a suitable engine. Joint agreement should have been reached by midsummer, defining the performance data of the engine and the form of possible cooperation. An engine suitable for one of the proposed 150-seaters could be available at the end of 1987 or the beginning of 1988. General Electric and Snecma are competing with the consortium, using further developments of the CFM56, which is now in regular service. [Text] [Gelsenkirchen AEROKURIER in German Jun 82 p 660] 9581

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